REMARKS

The above-identified patent application has been carefully reviewed in view of the Advisory Office Action of March 6, 2003. The Advisory Action refused to enter the claim amendments proposed by applicant in its Response to the Final Office Action of October 1, 2002 as those amendments were considered to raise new issues requiring further searching and as raising issues of new matter. The claim amendments made herein differ from those proposed in the Response to the Final Office Action of October 1, 2002 and the Remarks herein contain additional arguments for allowance of the claims that were not included in the Response to the Final Office Action of October 1, 2002.

The Final Office Action of October 1, 2002 rejected claims 1-18 under §112 as the amendment of the claims to include the limitation "self-phasing" was said to constitute new matter. Claims 1-18 were also rejected under §112 as being indefinite in regard to the terms "relatively rigid" and "relatively weak". Claims 1-18 were rejected as being obvious over Dumbaugh Patent No. 4,149,627 in view of Rosenstrom Patent No. 6,024,210. Claims 1-18 were rejected as being obvious over Dumbaugh in view of Venanzetti Patent No. 3,407,670. Reconsideration of this application is respectfully requested in view of the amendments above and the remarks which follow.

In the Final Office Action claims 1-18 were rejected under §112 as independent claims 1, 12 and 15 were amended to include the limitation "self-phasing", and as this limitation was said to constitute new matter. The limitation of "self-phasing" has been deleted above from independent claims 1, 12 and 15.

The Final Office Action also rejected claims 1-18 under §112 as being indefinite with

regard to the terms "relatively rigid" and "relatively weak" in claims 1, 12 and 15. These terms have been deleted from claims 1, 12 and 15 above. Claims 1, 12 and 15 have been amended above to indicate that each stabilizer is more rigid in a direction transverse to the line of stroke than the stabilizer is rigid in the direction of the line of stroke. It is respectfully submitted that all of the pending claims 1, 3-13 and 15-18 are now in compliance with the requirements of §112.

In the second full paragraph on page 6 of the Final Office Action it was indicated that the recitation "adapted to vibrate along a line of stroke" was not given patentable weight because the recitation occurred in the preamble to the claims. Independent claims 1, 12 and 15 have been amended above to delete the recitation "along a line of stroke for conveying" or "along a line of stroke" from the preamble of those claims. Independent claims 1 and 12 have also been amended above to require a plurality of drive springs, each having a central axis wherein each drive spring is adapted to compress and extend along a line of stroke generally parallel to the central axis of the drive spring. Independent claim 15 has similarly been amended to require that each drive spring is adapted to compress and extend along a line of stroke. These limitations are contained in the body of the claims and appropriate consideration thereof is respectfully requested. Claims 2 and 14 which required a plurality of drive springs have been cancelled.

In the Advisory Action, the note to paragraph 2 indicates the previously proposed claim limitation of "rotationally coupled" raised issues of new matter. Although applicant does not agree with this, the claims as amended herein do not include this limitation.

The Final Office Action rejected claims 1-18 as being obvious over Dumbaugh in view of Rosenstrom. The Final Office Action indicates that Dumbaugh discloses a vibratory apparatus with a bed 111, a plurality of inclined stabilizers 115, and a plurality of drive springs 114. The

Final Office Action indicates that Dumbaugh lacks the disclosure of two separate pairs of free-wheeling eccentric weights, but that it would have been obvious to a person of ordinary skill in the art to utilize the motors and control system in Rosenstrom in the bed structure of Dumbaugh to reduce cost and increase the durability of the system. Applicant continues to respectfully disagree.

Independent claim 1 requires that the first and second pairs of rotatable eccentric weights be "free-wheeling" with respect to one another, and that the rotatable eccentric weights are adapted to accumulatively synchronize with one another. The rotatable eccentric weights are described in the specification as free-wheeling at line three of page five, and free-wheeling is described in the last paragraph of page four of the specification. In paragraph four of the Office Action of April 4, 2002 in this application, the Examiner indicates that the term "free-wheeling" appears to be defined as "lacking physical or mechanical linkage with regards to rotation." The rotatable eccentric weights in Rosenstrom are not "free-wheeling" with respect to one another as they are rotationally linked to one another by an electrical control circuit, a motion controller, a motor speed controller, and a motor that <u>force</u> the eccentric weights to synchronize with one another.

In Rosenstrom the eccentric weights are attached to rotatable shafts that are rotated by respective motors. Rosenstrom utilizes shaft encoder devices 58 adjacent each shaft, a special electrical control system, a motion controller 60, a motor speed controller 62, and a "slave" motor to "force" the synchronization of the rotating eccentric weights with one another. As set forth in the Summary of the Invention in Rosenstrom, one of the modules that includes a rotatable eccentric weight is a master module having a first motor driving a first shaft (the "master" shaft)

at a programmed predetermined speed. A shaft position encoder device 58 is associated with the end of each shaft and generates a shaft position feedback signal indicative of the position of the eccentric weight on the associated shaft. A motion controller 60 receives each of the shaft position feedback signals and compares each of the shaft positions with predetermined relative phase angles or positions of the shafts and generates a control signal for each of the shafts (the "slave" shafts) whose position is varied from the predetermined position. The motor speed controller 62, responsive to the control signal from the motion controller, adjusts the speed of the motor (the "slave" motor) that rotates the slave shaft. The speed of the slave motor and slave shaft is varied until the wanted relative position of the slave shaft matches the predetermined position of the master shaft. Thus in Rosenstrom the electrical control system, motion controller, motor speed controller and the "slave" motor force the "slave" shaft to vary its speed and its position to match the position of the "master" shaft and its eccentric weights. The eccentric weights in Rosenstrom can not be considered to be free-wheeling with respect to one another as the rotational position of the "slave" shaft and its eccentric weights are physically and mechanically linked by the electrical control system, motion controller, motor speed controller, and the "slave" motor to the position of the "master" shaft and its eccentric weights. The eccentric weights in Rosenstrom are not adapted to accumulatively synchronize with one another without being physically or mechanically linked to one another for rotation ("free-wheeling") as is required in independent claim 1.

Use of the electrical control system, motion controller, motor speed controllers, and "slave" motor as taught by Rosenstrom to physically and mechanically force the rotating eccentric weights of the slave shaft to phase with the rotating eccentric weights of the master shaft by

varying the speed of the slave motor and slave shaft adds cost to the system and increases the complexity of the system, rather than reducing the cost and increasing the durability of the system, as does the present invention. The present invention eliminates the need for the complex electrical control system and motion controller of Rosenstrom which varies the speed of the slave motor and slave shaft with respect to the speed of the master shaft.

Dumbaugh teaches a "connection" to permit the use of independent sections in a counterbalance of long length. Dumbaugh only discloses one motor, and does not suggest the possibility of including first and second pairs of motors with rotatable eccentric weights. There is no teaching in the combination of Dumbaugh with Rosenstrom that first and second pairs of rotatable eccentric weights will properly phase and synchronize with one another when the weights are "free-wheeling" with respect to one another and are thereby not rotationally linked to one another for rotation, either mechanically or electrically, as required in claim 1. Only the present application of the applicant provides this teaching. Claim 1 is therefore not obvious over these references.

In addition, claim 1 has been amended to require that the rotating eccentric weights are adapted to rotate at <u>substantially the same operating speed</u> with respect to one another. This limitation is supported by the second full paragraph on page 10 of the application, which indicates that all motors reach full speed, and by the third full paragraph on page 14 of the application which indicates that it must be ensured that each of the motors is rotating at the same speed with respect to one another throughout the range of speed adjustment. As indicated above, the electrical control system in Rosenstrom is used to <u>vary the speed</u> of the slave motor and slave shaft with respect to the master shaft in order to force the synchronization of the associated

eccentric weights. Rosentrom therefore teaches away from the present invention, such that the present invention is not obvious over Dumbaugh in view of Rosenstrom.

The present invention has accomplished what others skilled in the art have not, namely, the proper synchronization of first and second pairs of free-wheeling rotatable eccentric weights without any mechanical, electrical or other physical rotational linking of the weights to one another to force synchronization. As stated in the application at page 4, the desire to accumulatively phase or synchronize a plurality of pairs of rotating eccentric weights has never previously been successfully achieved with free-wheeling rotating eccentric weights that are not physically or mechanically rotationally linked or coupled to one another. Rosenstrom teaches that it is impossible to make multiple pairs of vibratory motors and free-wheeling rotating eccentric weights properly synchronize and accumulatively add their output forces and power outputs unless some mechanical or physical connection, such as an electrical control circuit, motion controller, motor speed controller and slave motor, is used to force this to occur.

It is therefore respectfully submitted that independent claim 1 is not obvious over the combination of Dumbaugh and Rosenstrom. Allowance of independent claim 1 is respectfully requested. Claim 2 has been canceled. Claims 3-11 dependent from claim 1 and are submitted to be allowable therewith.

Independent claim 12 was also rejected as being obvious over Dumbaugh in view of Rosenstrom. Claim 12 has been amended in the same manner as independent claim 1 to require that the free-wheeling rotating eccentric weights rotate at substantially the same operating speed with respect to one another and that the rotatable eccentric weights are adapted to accumulatively synchronize with one another such that the output forces of the rotatable eccentric weights and

their respective power outputs accumulatively add to cause the bed to vibrate along a line of stroke. It is therefore respectfully submitted that independent claim 12 and its dependent claim 13 are allowable over these references for the same reasons as with regard to claim 1. Claim 14 has been cancelled.

Independent claim 15 was also rejected as being obvious over Dumbaugh in view of Rosenstrom. Claim 15 has similarly been amended as was claim 1 to require that the free-wheeling eccentric weights operate at substantially the same operating speed with respect to one another and that they are adapted to accumulatively synchronize with one another. It is therefore respectfully submitted that independent claim 15 is allowable over these references. Dependent claims 17 and 18 have been amended to further specify that during adjustment of the rotational speed of the vibratory motors to vary the vibration frequency of the bed, the vibratory motors continue to operate at substantially the same rotational speed with respect to one another. It is therefore respectfully submitted that claims 1, 3-13 and 15-18 are allowable over Dumbaugh and Rosenstrom.

Claims 1-18 were also rejected as being obvious over Dumbaugh in view of Venanzetti. The Final Office Action states that Dumbaugh discloses a vibratory apparatus with a bed 111, a plurality of inclined stabilizers 115, and a plurality of drive springs 114, but lacks two separate pairs of free-wheeling eccentric weights. Venanzetti is said to teach a plurality of motor and weight pairs in a vibratory apparatus such that it would be obvious to utilize a plurality of motor and weight pairs as taught by Venanzetti in the bed structure of Dumbaugh.

Independent claim 1 has been amended above to require a plurality of drive springs, wherein each drive spring has a central axis and each drive spring is adapted to compress and

extend along a line of stroke generally parallel to the central axis of the drive spring such that the bed vibrates along the line of stroke. The Final Office Action noted that the requirement that the bed vibrate along the line of stroke was previously in the preamble and was therefore not given any patentable weight. This limitation has now been positively included in the body of claim 1.

Venanzetti is concerned with reducing the physical size of the eccentric weights to reduce the load on the bearings and on the motors. Venanzetti offsets the eccentric masses on each shaft with respect to one another to thereby produce a torsional output force that creates a helical stroke. Venanzetti combines Figures 1, 2, and 3 to illustrate the invention. The vibrators 3, 4 in Venanzetti, as shown in Figure 3, have two horizontal rotating shafts 7 and 10. Two eccentric masses 5 and 6 are located on shaft 7 and two eccentric masses 8 and 9 are located on shaft 10. The vibrators are fixed below a common plate 1 as stated in column 1, line 52 and as shown in Figures 1 and 4. The eccentric masses on each shaft are equally offset with one another at an angle of incidence (i) as shown in Figure 3. The two eccentric masses 5 and 8 each have a force output of R1 and the two eccentric masses 6 and 9 each have a force output of R2. When the masses are rotated in opposite directions, the horizontal components of R1 and R2 are additive and form a force couple in the horizontal plane that develops a "rotary" or "twisting" kind of vibratory motion. The vertical components of R1 and R2 additively combine to develop a "shaking" or "up and down" vibratory motion. Consequently, a beneficial vibratory <u>helical motion</u> used for circular conveying is achieved by the combination of the "rotary" vibratory motion and the "shaking" vibratory motion in Venanzetti. As stated at column 1, line 55 of Venanzetti, the plate 1 is suspended on a bed through a plurality of springs 12 suitable to "ensure freedom of the combined rotary and shaking alternative movement" provided by the vibrators.

In Figure 5, two independent pairs of vibrators 21 and 22 are shown (column 2, line 51). Vibrator 22 is placed at the top, and vibrator 21 is placed under plate 1 at the bottom of a Spiral Elevator. Thus a combined "rotary" (force couple) and a "shaking" motion are achieved, but the stresses are half those generated by the embodiment in Figure 4 (which had only two shafts). In Figure 6, a plurality of vibrators 21, 22, and 28 are arranged on three different parallel planes along the vertical height of a Spiral Elevator. Again a combined "rotary" vibratory motion and "shaking" vibratory motion to provide a helical stroke is provided by each vibrator.

In Figure 7, only two vibrator pairs 33 and 34 are used. The planes passing through the shafts of each vibrator pair are vertical. The machine 30 in Figure 7 is subject to combined rotary and shaking motion. (Column 3, line 10). At column 1, line 44, it is said that Figure 7 shows an embodiment wherein the motion axis is horizontal. Similarly, at column 3, line 21, it is also said that the axis of the motion being generated in Figure 7 is horizontal. In the embodiments of Figures 4-6, the axis of motion of the combined rotary vibratory motion and shaking vibratory motion of the spiral elevators is vertical, such as about and along the central vertical axis of the spiral elevators. However, in Figure 7 the axis of motion of the combined rotary vibratory motion and shaking vibratory motion is horizontal rather than vertical as in Figures 4-6. The machine 30 of Figure 7 is provided with a helical stroke as are the other embodiments in Venanzetti. Only the orientation of the helical stroke is changed in Figure 7.

In Figures 8 and 9, only one pair of vibrators is shown, respectively labeled 42a and 42b, and 51a and 51b. (Column 3, lines 26 and 41). By spreading the two vibrators in Figure 9 further apart, by noting dimension "a" in Figure 9, the magnitude of the horizontal force couple can be increased.

The Dumbaugh patent applies to sectionalizing the counterbalance of a long, unidirectional conveyor. Therefore, the vibratory apparatus in Dumbaugh has a linear stroke, wherein the drive springs compress and extend along the central linear axis of each drive spring at an angle of usually 30° to 45° from horizontal to convey the load forward. The springs in Venanzetti are isolation springs used to support or mount the vibratory machine and that follow the helical stroke generated by the vibrators in Venanzetti. Consequently these springs do not compress and extend along a central linear axis of the spring. Claim 1 requires that each drive spring is adapted to compress and extend along a line of stroke generally parallel to the central axis of the drive spring. However, as explained above, Venanzetti teaches the combination of a rotary (horizontal twist) kind of stroke and a shaking (vertically up and down) kind of stroke to achieve a helical, circular stroke. The fundamental linear stroke action required in Dumbaugh and in claim 1 is in conflict with the helical stroke action provided in Venanzetti. It would not be obvious to combine Venanzetti with Dumbaugh due to the different vibratory stroke actions of Venanzetti and Dumbaugh. Neither would combining Venanzetti with Dumbaugh provide the stroke as required in claim 1.

Claim 1 also requires that each rotatable eccentric weight is adapted to provide an output force generally perpendicular to its axis of rotation. In Venanzetti the eccentric masses 5 and 6 that are attached to the shaft 7 are considered to be a single eccentric weight pursuant the present application at page 8 which indicates that all eccentric weights on a single motor are considered to be a single eccentric weight. As an example, as shown in Figure 3 of the present application, the eccentric weights 20 located on each side of the motor are considered to be a single eccentric weight. The eccentric weights 20 as shown in Figure 3 are aligned with one another and thereby

provide an output force that is generally perpendicular to the axis of rotation of the weights 20 as called for in claim 1. However, in Venanzetti the masses 5 and 6, that constitute one eccentric weight as defined in the present application as they are connected to a single motor, are offset with respect to one another, and are located on opposite ends of the shaft 7, such that the output force provided by the rotation of these masses is torsional rather than perpendicular to the axis of rotation. Thus as indicated at column 3, line 49 of Venanzetti, each vibrator provides an output torque. This torsional output force produces a helical stroke and the resulting combined rotary vibratory motion and shaking vibratory motion. The rotatable eccentric weights in Venanzetti (one eccentric weight constituting the masses 5 and 6, and a second eccentric weight constituting the masses 8 and 9) do not respectively provide an output force that is generally perpendicular to their axis of rotation as required in claim 1. It is therefore also respectfully submitted that independent claim 1 is not obvious over the combination of Venanzetti with Dumbaugh for these reasons.

It is respectfully submitted that independent claim 1 is not obvious over Dumbaugh and Venanzetti. Claims 3-11 depend from claim 1 and are therefore also respectfully submitted to be in condition for allowance.

Independent claim 12 has been amended in a manner similar to claim 1 requiring a plurality of drive springs each adapted to compress and extend along a line of stroke generally parallel to the central axis of the drive spring such that the bed vibrates along the line of stroke. Claim 12 has also been amended to require a plurality of isolation springs of the type as called for in claim 7. Independent claim 15 has also been amended to require that each drive spring be adapted to compress and extend along a line of stroke generally parallel to the central axis of the

drive spring such that the rotating eccentric weights vibrate the bed along the line of stroke. It is therefore respectfully submitted that independent claim 12 and its dependent claim 13, and independent claim 15 and its dependent claims 16-18, are allowable over the cited references.

Allowance of claims 1, 3-13 and 15-18 is respectfully requested. The Examiner is respectfully invited to telephone the undersigned regarding this application in order to advance prosecution.

Respectfully submitted,

Date: 3-28-03

Jeffrey R. Gray
Registration No. 33,391
Barnes & Thornburg
P.O. Box 2786
Chicago, Illinois 60690-2786
(312) 368-1300